

SIEMENS

**MAMMOMAT 3
MAMMOMAT 3-Stereo
MAMMOMAT C3**

RX

Generator

Setting Instructions

Register 4

RXB7-211.032.01.03.02

englisch

Replaces:RXB7-211.032.01.02.02

03.93



Weitergabe sowie Vervielfältigung dieser Unterlage, Verwertung und
Mitteilung ihres Inhalts nicht gestattet, soweit nicht ausdrücklich
zugestanden. Zu widerhandlungen verpflichten zu Schadenersatz. Alle
Rechte für den Fall der Patenterteilung oder GM-Eintragung vorbehalten

Proprietary data, company, confidential. All rights reserved.
Confié à titre de secret d'entreprise. Tous droits réservés.
Confiado como secreto industrial. Nos reservamos todos los derechos.

| | Page | Rev. |
|--|------------|------|
| Cover sheet | 1 | 03 |
| Contents, revision level | 2 | 03 |
| 1 Prerequisites | 1-1 | 03 |
| Meters and aids required | 1-1 | |
| Tools required | 1-1 | |
| Notes on these instructions | 1-1 | |
| Important notes on start-up | 1-1 | |
| Checking and recording for the area of application of the X-ray decree | 1-2 | |
| Checking and recording for the DHHS area of application | 1-2 | |
| Protective measures | 1-3 | |
| 2 Line connection and power supply | 2-1 | 03 |
| Checks before powering up the generator | 2-1 | |
| Line voltage and line frequency | 2-1 | |
| Measuring the line internal resistance | 2-1 | |
| Checking the line voltage in the generator | 2-2 | |
| Checking the supply voltages | 2-2 | |
| 3 Inspection and testing | 3-1 | 03 |
| Checks without high voltage | 3-1 | |
| Checking the rotating anode | 3-1 | |
| Checks with high voltage | 3-2 | |
| Preparations | 3-2 | |
| Checks: radiographic voltage, tube current and mAs values | 3-3 | |

Setting Instructions

3

Contents, Rev.

| | | Page | Rev. |
|----------|---|-------------|-------------|
| 4 | Start-up and functional test of the IONTOMAT PM | 4-1 | 03 |
| | Checking and programming with the Service PC | 4-1 | |
| | Checking the film density | 4-5 | |
| | Checking the automatic transparency adaption | 4-6 | |
| | Checking Cut-off dose and resolution | 4-7 | |
| 5 | Further programming | 5-1 | 03 |
| | Setting the real time clock | 5-1 | |
| | Setting the tube current reduction | 5-1 | |
| | Reducing the radiographic power | 5-2 | |
| | For MAM C3: kV default value on powering up | 5-2 | |
| 6 | Final procedures | 6-1 | 03 |
| | Recording the programmed values | 6-1 | |
| | Reading the exposure counter and deleting the error memory | 6-1 | |
| | Removal of the measuring instruments | 6-1 | |
| 7 | Appendix | 7-1 | 03 |
| | Working with the Service PC | 7-1 | |

Meters and aids required

- Line resistance meter 44 15 733 RV090
- Oscilloscope e.g. TEKTRONIX 314
- Digital multimeter e.g. FLUKE 8000 A MAS
- Densitometer e.g. PDA 81
- Service PC (e.g. Siemens - Nixdorf PCD 3NSX/20 or similar) with connecting cable (PC-Generator) part no. 96 60 978 RE999
- Normi 7 test body (provided by the customer)
or SIB phantom Type 42 001 (PTW or INAK)

Note: *For safety reasons, the existing PE conductor in the power cord must under no circumstances be disconnected when operating the oscilloscope.*

For those measurements in which any resulting ground loops may falsify the measuring result, use the differential amplifier (difference measurement).

Tools required

Usual assembly tools.

Notes on these instructions

- Checks and/or adjustments which must be made with X-rays switched on are marked with the radiation warning symbol .
- If brackets appear in the text after a switching element, e.g. (G2162-6/1A), the numbers in the brackets indicate the page and circuit path number of the wiring diagram containing the switching element.

Important notes on start-up

The MAMMOMAT 2 is adjusted, programmed and tested in the factory, leaving only the function tests to be performed.

When the measurements to be made (kV, mAs, etc.) are within the tolerances in these instructions, these indicate that the settings made in the factory have not changed and the equipment is fully serviceable.

The measured values marked with \gg shall be entered in the "Start-up" column in the test certificate provided.

The Service PC is required only for programming according to:

- Section.8 Start-up and functional test of the Iontomat PM
 - Programming the "Correction curve"
 - Setting the "Sensitivity" (film density)
 - Setting the "Sensitivity correction" (adaptation to different exposure techniques)

- Section.9 Further programming
- Section.10 Final procedures
 - Recording the programmed values
 - Setting the real-time clock
 - Reading the exposure counter and deleting the error memory

Note: *If the generator is switched off with the Service PC connected, wait approximately 5 seconds before switching it on again.*

Checking and recording for the area of application of the X-ray decree

In the area of application of the German X-ray decree, an acceptance test certificate is supplied, most of which is completed in the factory.

Only:

- cut-off dose
- resolution of the film/screen systems used
- output values of the constancy test

must be determined by the owner of the equipment and recorded in the acceptance test certificate.

Furthermore, the front page of the acceptance test certificate must also be completed with the operator's data.

Checking and recording for the DHHS area of application

In the area of application of DHHS regulations, additional measurements and checks must be made according to the instructions "DHHS Maintenance Schedule and User's Spot Checks" RB7-211.101... (included in the "DHHS supplements to the operating instructions" RB7-211.203...).

- Sec. Required labels
- Sec. Radiation-on indicators
- Sec. Manual termination of exposure
- Sec. Check the maximum adjustable mAs with the following kV-values
- Sec. Reproducibility
- Sec. kVp-accuracy
- Sec. mAs-accuracy
- Sec. Automatic exposure control

The results must be recorded in "Test certificate" RB7-211.037... .

Some of the values to be determined can be taken from the test certificate.

Protective measures

- Prior to any intervention in the equipment, disconnect it from the power supply with the main switch.

Note: *If the system is only switched off at the deck or with S2/D711, line voltage will still be present at the generator line connection, line filter Z1, transformer T1, transformer T10 and also p.c. board D711 as well as the line connection terminal of the stand (see wiring diagram sheet X 2117-15-).*

- To prevent accidental triggering of high voltage and radiation, set the switch S2 (SS) on p.c. board D702 to "OFF" (position 2) (no activation of the SS relay).

Note: *After shut-down of the system, there may still be about 380 V d.c. present on the intermediate circuit. This will be indicated by LED V24 on p.c. board D710. This voltage will drop to less than 30 V within about 3 minutes; the LED extinguishes at about 30 V.*

- Note:**
- *The p.c. boards contain electrostatic highly-sensitive components requiring particular care in their handling (ground before making contact and place only on a conductive support; see TI 219).*
 - *Before removing or inserting a p.c. board, switch off the equipment.*

Checks before powering up the generator

- On p.c. board D702:
 - Set switch S1 (UZW) to "OFF" (position 2)
 - Set switch S2 (SS) to "OFF" (position 2)
 - Set switch S3 to position 1

Line voltage and line frequency

Note: With single-phase supply, the fuse holders F20 and F5 (on board D 711) must be bridged according to the wiring diagram on page 15! (Jumpers in the service bag)

With two-phase supply, fuse holders F20 and F5 must be fitted with fuses!

The equipment has already been set to the required line voltage in the factory (see test certificate) and adjustment to the line frequency is not needed.

But if, nevertheless, reconnection for the line voltage is necessary, this must be done at the transformer T 10 as well as p.c. board D711 (insertion or removal of fuses) in accordance with the wiring diagram X 2117 - 15.

Measuring the line internal resistance

- Remove F10 and F20.
- Connect line resistance meter to fuse holders F10 and F20.
- System contactor "ON"
- Carry out measurement
- System contactor "OFF"

To achieve the full output, the resistance measured must not exceed the following values:

| MAMMOMAT 3/Stereo | MAMMOMAT C3 |
|-----------------------------|-------------------|
| 0.25 Ohm at 110 V | 0.35 Ohm at 110 V |
| 0.45 Ohm at 208 V | 0.70 Ohm at 208 V |
| 0.50 Ohm at 230 V | 0.80 Ohm at 230 V |
| 0.60 Ohm at 240 V | 1.00 Ohm at 240 V |
| 0.65 Ohm at 277 V | 1.05 Ohm at 277 V |
| 0.85 Ohm at 400 V (2-phase) | 1.40 Ohm at 400 V |

If the above values are exceeded, reduce the generator power in accordance with Section 5.

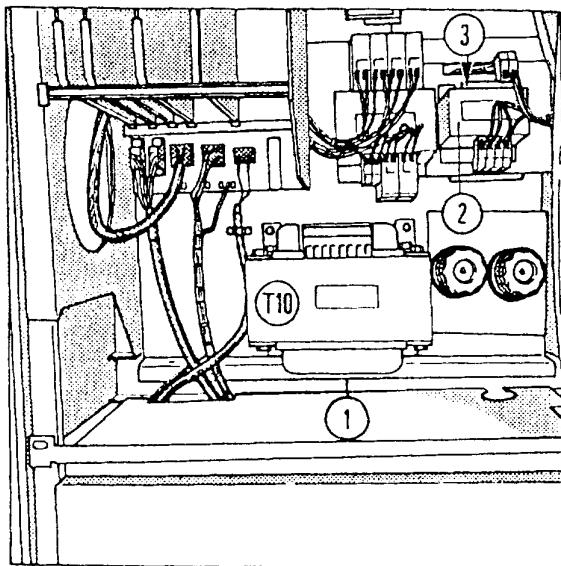


Fig.1

Checking the line voltage in the generator

- Remove F10 and F20
- System contactor "ON"
- Measure voltage at F10 and F20
- Check that the line voltage agrees with the voltage plugged on transformer T10 and board D711
- System contactor "OFF"
- Re-insert F10 and F20
- System contactor "ON" (Do not switch generator on yet)
 - There must be 230 V (+ 10%, -15%) at transformer T1 (2/Fig.1), terminals 1 and 3
(X 2117 -15-)
 - There must be a voltage between 195 V and 264 V at the output of the line filter Z1 (mechanically behind transformer T1; 3/Fig. 1) (X 2117 -21-)

Checking the supply voltages

The correct supply voltages + 5 V, + 15 V, - 15 V and + 24 V have already been set in the factory. Only a visual check of the function is therefore needed.

- Switch on the generator
- The following diodes must be "on" on p.c. board D 704:

| | |
|------|----------|
| V 39 | (+ 15 V) |
| V 38 | (- 15 V) |
| V 41 | (+ 5 V) |
| V 40 | (+ 24V) |

Checks with high voltage

Checking the microprocessors

The following LED displays on the processor p.c. boards indicate whether the relevant microprocessors are operating correctly.

- The following conditions must be indicated after not more than 15 s:

| Microprocessors for: | LED displays |
|-----------------------------|---|
| Master: P.c. board D 702 |  <ul style="list-style-type: none">○ must be off● weakly lit |
| IONTOMAT PM: P.c board D701 |  <ul style="list-style-type: none">○ must be off● must be flashing (2-3 Hz) |

- P.c.board D 711:
 - V 9 "on" (line voltage on)
 - V 13 "off"
 - V 11 "on" (generator on)
 - V 15 "on" (intermediate circuit - heating)

Checking the rotating anode

- On p.c. board D 702, set the switches
S1 (UZW) "on" (position 1)
S2 (SS) "off" (position 2)

Note for MAMMOMAT C3

- The collimating cone must be used on the swivel arm.
- Generator "ON"
- Trigger exposure on control console
 - The rotating anode must start up
 - At the end of the time limit, the rotating anode is braked
- Release the trigger switch

Note: If the trigger switch is prematurely released, "Limit" will be displayed.

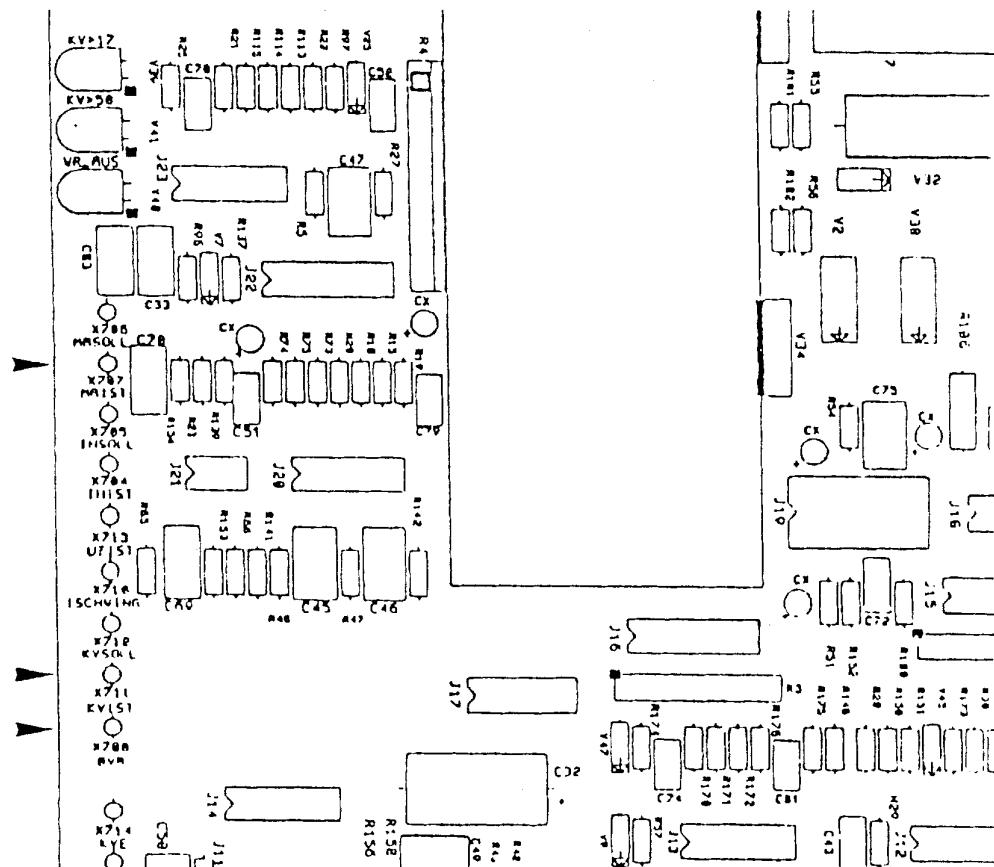
- Generator "OFF"

Checks with high voltage

Preparations

- Check:
 - The high-voltage plug must be plugged into H1 and locked.

- Set switch S2 (SS) to "on" (position 1) on p.c. board D 702
- Connect mAs meter to the mAs measuring sockets X3 and X4 on p.c. board D 710.
- Connect oscilloscope to p.c. board D705:
 - Channel 1 to measuring point "KVist" (1 V $\hat{=}$ 5 kV)
 - Channel 2 to measuring point "mAist" (1 V $\hat{=}$ 40 mA)
 - Trigger at measuring point "kVE" (start with high voltage "on") (rising edge)
 - Twist the measuring leads and connect their screens to 0 VA.



Checks: radiographic voltage, tube current and mAs values *

- Generator "ON"
 - Trigger test exposures with the following exposure values and check the kV values and tube current characteristic on an oscilloscope (see oscillograms).
 - The accuracy of the kV is $\pm 5\%$ plus ± 1.5 kV during the first 5 ms of the exposure.
- For mA-Values < 50 mA additional ± 2 kVp during 5 ms.
- The tube current must rise quickly to the set value at the beginning of the exposure and run linearly during the exposure.
 - The accuracy of the mAs product must be $\pm 5\%$.
 - There can be overshoots or undershoots when the tube current builds up
Therefore check the switching time:

$$t_{\text{nominal}} = \frac{\text{set mAs}}{\text{mA}_{\text{nominal}}}$$

The measured switching time may deviate $\pm 15\%$ from the nominal switching time

Note: Tube current reduction

In the case of the MAMMOMAT 3 / 3 Stereo (not MAMMOMAT C 3) the *tube current reduction* can be switched on (cf. Section 5 and test certificate). In this way the tube current is reduced to approx. 50 mA at the start of the exposure during the time programmed in Section 5.

The *tube current reduction* is effective only in IONTOMAT mode with Bucky

Assignment of the diagrams:

Mammomat 3 / 3 Stereo in mAs mode

Fig. 1 - Fig.8

Mammomat 3 / 3 Stereo with tube current reduction switched on,
Iontomat mode with Bucky

Fig. 9 - Fig.10

Mammomat 3 / 3 Stereo with tube current reduction switched off
and Iontomat mode

Fig. 11 - Fig.12

Mammomat C 3

Fig. 13 - Fig.17

For tungsten tube P49 W 0,3

■ , 30 kV, 20 mAs ($P = 4.5 \text{ kW}$)

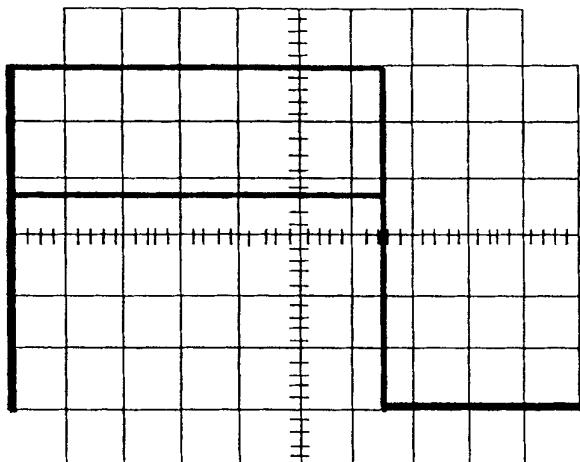


Fig. 1

30 kV 1 V/T (1 T $\approx 5 \text{ kV}$)
150 mA 1 V/T (1 T $\approx 40 \text{ mA}$)
20 ms/T

For molybdenum tube P49 MO 0,3

■ , 30 kV, 20 mAs ($P = 3.6 \text{ kW}$)

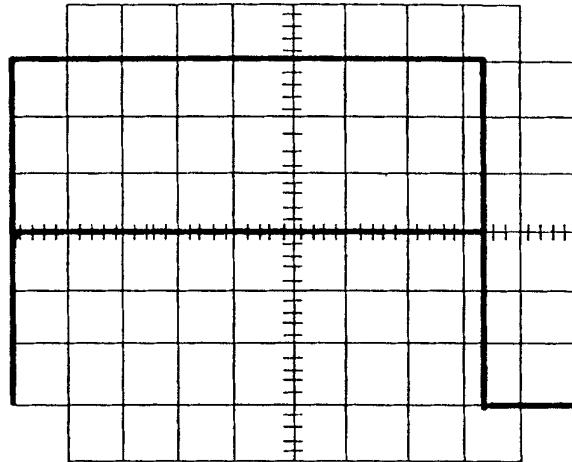


Fig. 2

30 kV 1 V/T (1 T $\approx 5 \text{ kV}$)
120 mA 1 V/T (1 T $\approx 40 \text{ mA}$)
20 ms/T

- Record the measured kV and mAs value in the test certificate supplied under the items "Accuracy of the x-ray tube voltage- ■ " or "Accuracy of the mAs product" in the "Start-up" column.

For tungsten tube P49 W 0.3

■ , 49 kV, 100 mAs ($P = 4.5 \text{ kW}$)

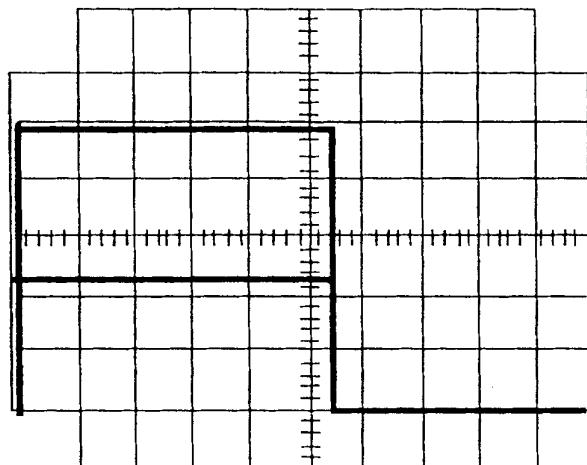


Fig. 3

49 kV 2 V/T (1 T $\approx 10 \text{ kV}$)
92 mA 1 V/T (1 T $\approx 40 \text{ mA}$)
0.2 Sec./T

■ , 25 kV, 500 mAs ($P = 4.5 \text{ kW}$)

For molybdenum tube P49 MO 0.3

■ , 49 kV, 100 mAs ($P = 3.6 \text{ kW}$)

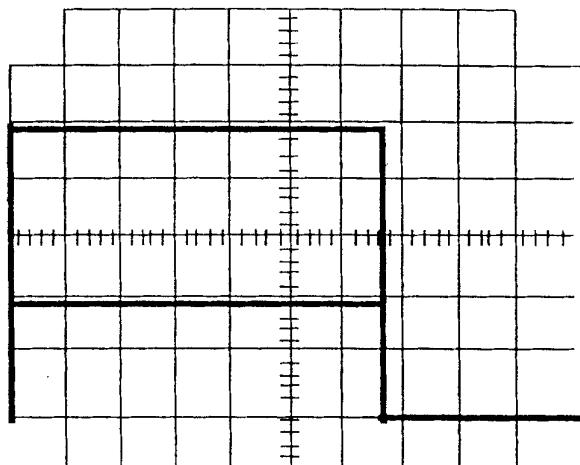


Fig. 4

49 kV 2 V/T (1 T $\approx 10 \text{ kV}$)
73 mA 1 V/T (1 T $\approx 40 \text{ mA}$)
0.2 Sec./T

■ , 25 kV, 500 mAs ($P = 3.6 \text{ kW}$)

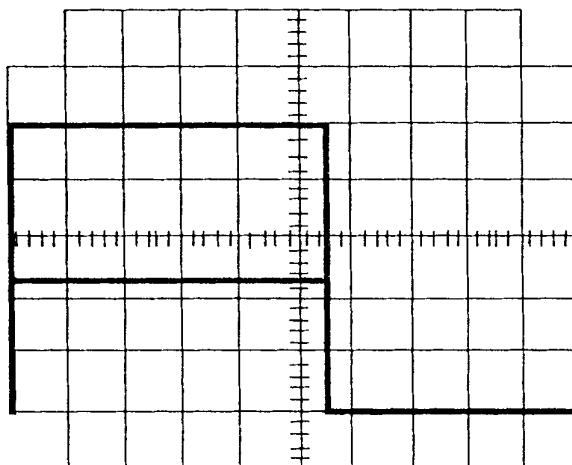


Fig. 5

25 kV 1 V/T (1 T $\approx 5 \text{ kV}$)
180 mA 2 V/T (1 T $\approx 80 \text{ mA}$)
0.5 Sec./T

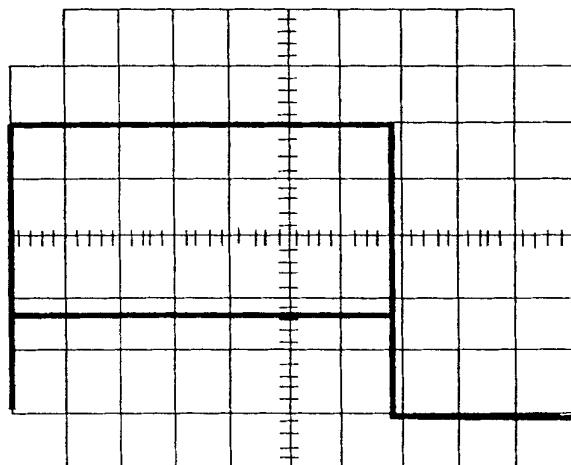


Fig. 6

25 kV 1 V/T (1 T $\approx 5 \text{ kV}$)
144 mA 2 V/T (1 T $\approx 80 \text{ mA}$)
0.5 Sec./T

For tungsten tube P49 W 0.3

Note: The small focus is selected by attaching the magnification attachment

, 30 kV, 10 mAs ($P = 0.85 \text{ kW}$)

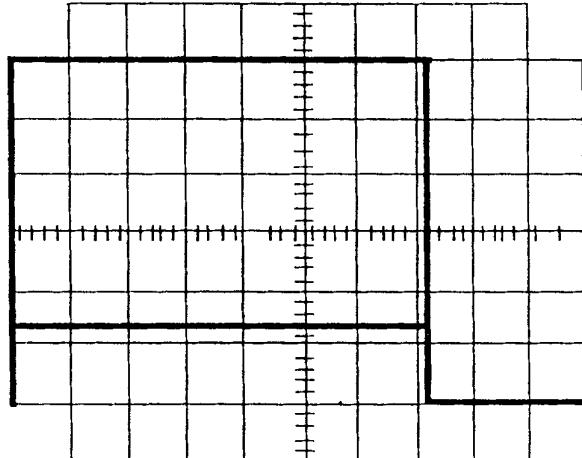


Fig. 7

30 kV 1 V/T (1 T \approx 5 kV)
28 mA 0,5 V/T (1 T \approx 20 mA)
50 ms/T

For molybdenum tube P49 MO 0.3

, 30 kV, 10 mAs ($P = 0.6 \text{ kW}$)

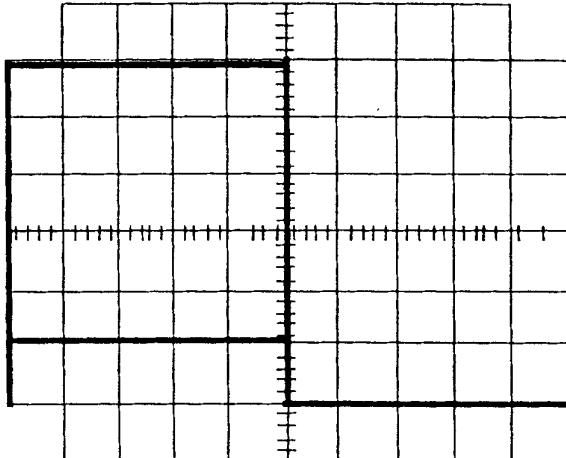


Fig. 8

30 kV 1 V/T (1 T \approx 5 kV)
20 mA 0,5 V/T (1 T \approx 20 mA)
100 ms/T

- Generator "OFF"
- Record the measured kV and mAs value in the test certificate supplied under the items "Accuracy of the x-ray tube voltage- or "Accuracy of the mAs product" in the "Start-up" column.

For tungsten tube P49 W 0.3

■ , 30 kV, Iontomat with grid (P = 4.5 kW)
40 mm Plexiglas

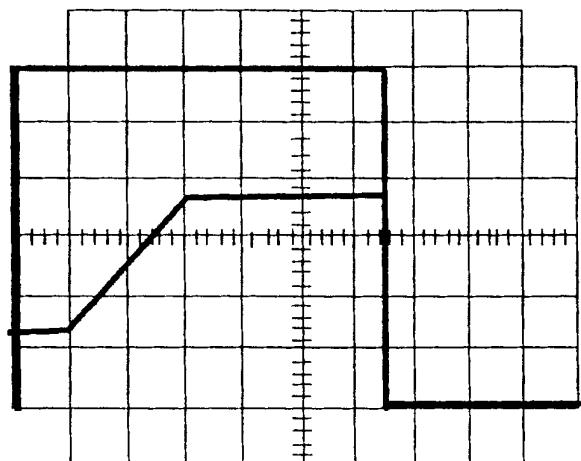


Fig. 9

30 kV 1 V/T (1 T \approx 5 kV)
150 mA 1 V/T (1 T \approx 40 mA)
100 ms/T (t = depending on progr. sensitivity)

For molybdenum tube P49 MO 0.3

■ , 30 kV, Ionto. w. grid (P = 3.6 kW)
40 mm Plexiglas

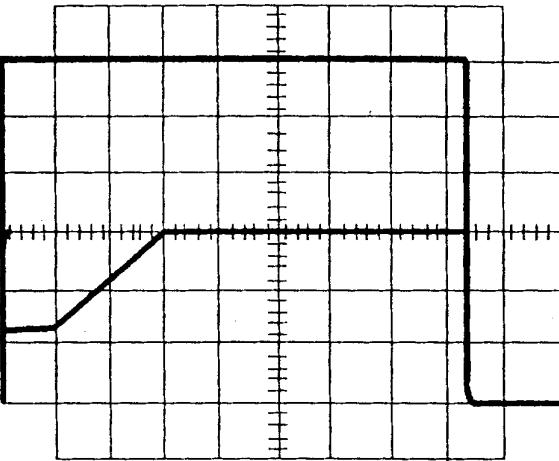
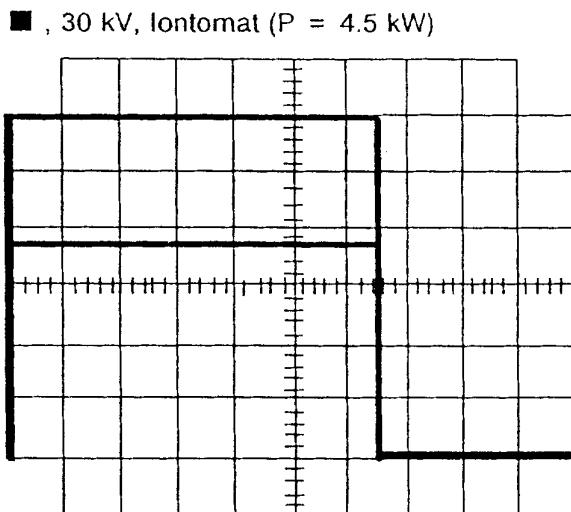


Fig. 10

30 kV 1 V/T (1 T \approx 5 kV)
120 mA 1 V/T (1 T \approx 40 mA)
100 ms/T (t = depending on progr. sensitivity)

For tungsten tube P49 W 0.3

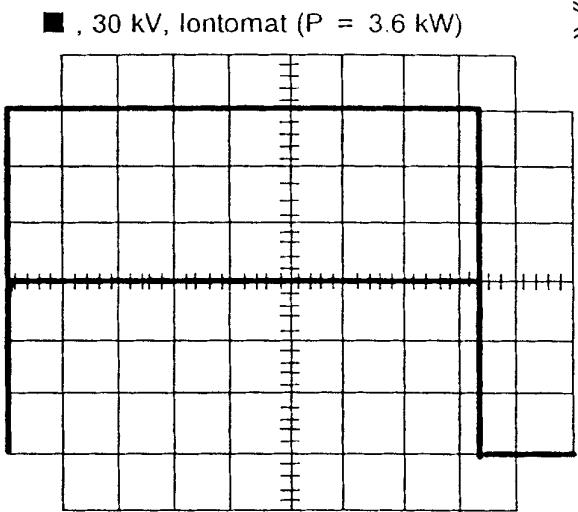


40 mm Plexiglas

Fig. 11

30 kV 1 V/T (1 T \approx 5 kV)
 150 mA 1 V/T (1 T \approx 40 mA)
 100 ms/T (t = depending on progr. sensitivity)

For molybdenum tube P49 MO 0.3



40 mm Plexiglas

Fig. 12

30 kV 1 V/T (1 T \approx 5 kV)
 120 mA 1 V/T (1 T \approx 40 mA)
 100 ms/T (t = depending on progr. sensitivity)

- Record the measured kV and mAs value in the test certificate supplied under the items "Accuracy of the x-ray tube voltage" or "Accuracy of the mAs product" in the "Startup" column
 - For 30 kV value to Fig. 13 and Fig. 16
 - For 20 mAs value to Fig. 17

Für Eureka tube assembly (MAMMOMAT C 3)

■ , 30 kV, 20 mAs ($P = 3.0 \text{ kW}$)

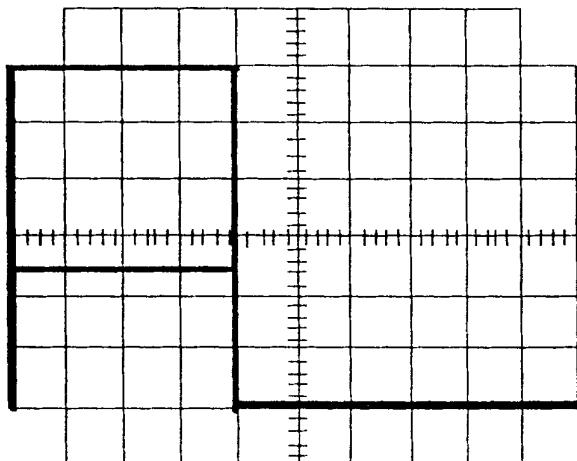


Fig. 13

30 kV 1 V/T (1 T $\approx 5 \text{ kV}$)
100 mA 1 V/T (1 T $\approx 40 \text{ mA}$)
200 ms/T

■ , 40 kV, 100 mAs ($P = 3.0 \text{ kW}$)

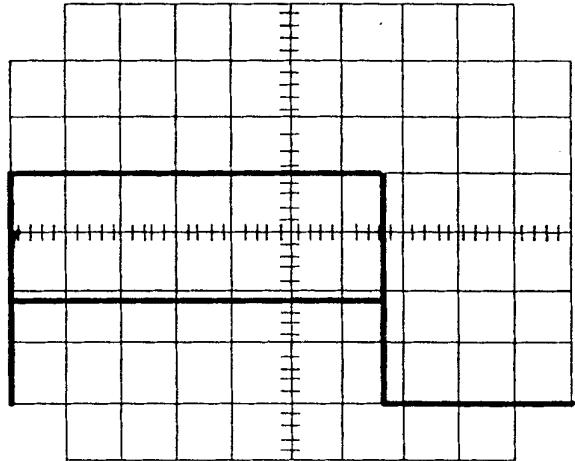


Fig. 14

40 kV 2 V/T (1 T $\approx 10 \text{ kV}$)
75 mA 1 V/T (1 T $\approx 40 \text{ mA}$)
200 ms/T

■ , 25 kV, 450 mAs ($P = 2.5 \text{ kW}$)

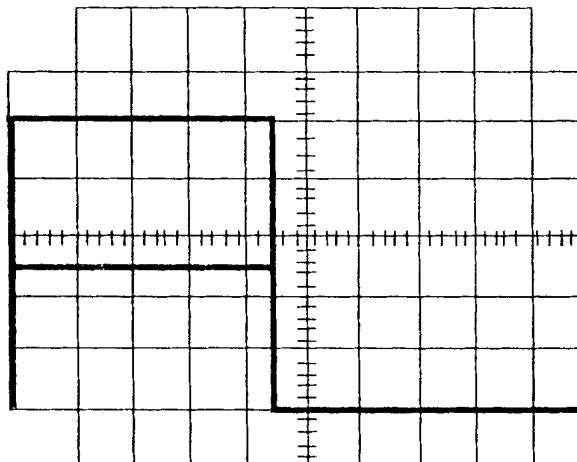


Fig. 15

25 kV 1 V/T (1 T $\approx 5 \text{ kV}$)
100 mA 1 V/T (1 T $\approx 40 \text{ mA}$)
1,0 Sec./T

■ , 30 kV, 25 mAs ($P = 0.6 \text{ kW}$)

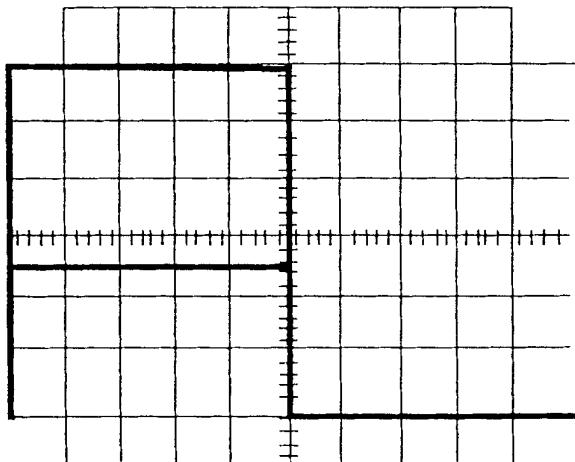


Fig. 16

30 kV 1 V/T (1 T $\approx 5 \text{ kV}$)
20 mA 0,2 V/T (1 T $\approx 8 \text{ mA}$)
0,2 Sec./T

For Eureka tube assembly (MAMMOMAT C3)

■ , 30 kV, 20 mAs ($P = 3.0 \text{ kW}$)

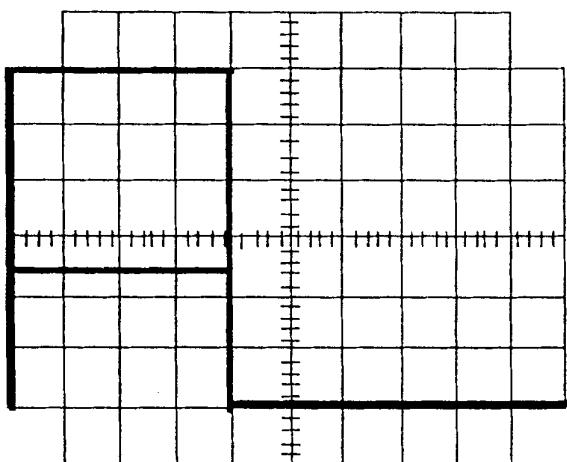


Fig. 17

30 kV 1 V/T (1 T $\leq 5 \text{ kV}$)
100 mA 1 V/T (1 T $\leq 40 \text{ mA}$)
50 ms/T

Checking and programming with the service PC

- Use the Service PC to check and program the IONTOMAT PM.
- Operation of the Service PC is described in section 11
- Connect service PC on board D702 using connection cable, the switch S3 on board D 702 must be set to position 1.
- Generator and Service PC "ON"

| Display | Entry required | Remarks |
|----------------------------|---|--|
| c:\> | {A:} {B:} <Enter> | According to Service PC disk drive names |
| a:\> | MAMC2<Enter> | |
| Your name please | BENUTZERNAME <Enter> | |
| Password please | ***** <Enter> | see section 7 |
| Main menu | <↓> <↑> <Enter> | Select "Configuration" subroutine |
| Configuration | <↓> <↑> <Enter> | Select "IONTOMAT PM" subroutine |
| IONTOMAT PM | <↓> <↑> <Enter> | Select "Sensitivity" subroutine |
| Sensitivity | <↓> <↑> <→> <←>, <Tab> 1...31.0 <F 2> | Program the plug positions (Sensitivity) according to the film-screen system used, sections 8-2 and 8-3. Two different systems are possible. Save data with <F2> |
| IONTOMAT PM | <↓> <↑> <Enter> | Select "Corr. curve" subroutine |
| Corr. curve | <F 2> 0...10 | Program the correction curve according to the film-screen system used, sections 8-2 and 8-3. Two different systems are possible. |
| IONTOMAT PM | <ESC> | |
| Configuration Main menu | <ESC> <F 10> | Program exited. |

4-2 Start-up and functional test of the IONTOMAT PM

Values recommended for the basic setting of the sensitivity ("plug positions")

| Possible combinations: | | Sensitivity | Curve No. for the tube: | |
|------------------------|------------------|-------------|-------------------------|-----------|
| Film | Folie | | P49 Mo 0.3 Eureka | P49 W 0.3 |
| Dupont Micro | Kodak Min-R | 20 | 2 | 4 |
| Kodak Min-R | Kodak Min-R | 18 | 2 | 4 |
| Kodak Ortho MA | Kodak Min-R | 16 | 2 | 4 |
| Kodak Ortho M-1 | Kodak Min-R | 16 | 2 | 4 |
| Kodak TMAT M | Kodak Min-R fast | 9 | 2 | 4 |
| Dupont Micro | Agfa MR 50 | 17 | 1 | 3 |
| Agfa Mamoray MR 3 | Agfa MR 50 | 17 | 1 | 3 |
| Agfa Mamoray RP 3 | Agfa MR 50 | 19 | 1 | 3 |
| Dupont NTD 70 | Agfa MR 50 | 22 | 1 | 3 |
| Dupont 75 M | Agfa MR 50 | 22 | 1 | 3 |
| Dupont 70 M | Agfa MR 50 | 22 | 1 | 3 |
| Agfa Mamoray MR 3 | Agfa MR Detail | 16 | 2 | 4 |
| Agfa Mamoray RP 3 | Agfa MR Detail | 19 | 2 | 4 |
| Agfa Strukturix D 8 | Agfa MR Detail | — | 2 | 4 |

Start-up and functional test of the IONTOMAT PM

4-3

| Possible combinations: | | Sensitivity | Curve No. for the tube: | |
|--------------------------|---------------------|-------------|-------------------------|-----------|
| Film | Folie | | P49 Mo 0.3 Eureka | P49 W 0.3 |
| Dupont Lo Dose | Dupont Lo Dose | 20 | 1 | 3 |
| Dupont Lo Dose | Dupont Lo Dose-2 | 19 | 1 | 3 |
| Dupont Cronex Micro | Dupont Ortho Micro | 16 | 2 | 4 |
| Dupont Cronex Micro Plus | Dupont Ortho Micro | 16 | 2 | 4 |
| Dupont Microvision | Dupont Ortho Micro | 16 | 2 | 4 |
| 3 M Trimax M | 3 M Trimax Alpha 2M | 19 | 2 | 4 |
| 3 M Trimax MS | 3 M Trimax Alpha 2M | 14 | 2 | 4 |
| 3 M MS | 3 M Trimax T2 | — | 2 | 4 |
| 3 M FM | 3 M Trimax T2 | — | 2 | 4 |
| 3 M FM | 3 M Trimax T1 | — | 2 | 4 |
| CEA MA 16 | Siemens Orthex MA | 16 | 2 | 4 |
| Fuji MIMA | Fuji Hi-Mammo-M1 | 15 | 2 | 4 |
| Konica CM | Siemens Orthex | 16 | 2 | 4 |

4-4 Start-up and functional test of the IONTOMAT PM

Note: If the film-screen system used is not listed in the table, the following applies:

- The sensitivity to be programmed must be determined by means of test exposures at 30 kV and 2 cm of Plexiglas. Recommendation: Start with sensitivity 13.

Establishing the type of screen

Determine whether the screen has green or blue emission by checking the manufacturer's data or by exposing the open cassette. Recommended curve number for the corresponding screen-tube combination:

| Screen Type | Tube unit type | Curve |
|-----------------------|----------------------|-------|
| Green-emitting screen | Molybdenum tube unit | 2 |
| | Tungsten tube unit | 4 |
| Blue-emitting screen | Molybdenum tube unit | 1 |
| | Tungsten tube unit | 3 |

The final values for the sensitivity are determined in the section "Checking the film density".

Note: The generator is provided with a dose monitoring facility. If this dose monitoring responds, radiation is stopped after about 100 ms (the "LIMIT" display lights up on the deck and the audible signal sounds). The dose monitoring thus prevents any exposure over the time limit due to a fault, for example if the lead to the measuring field is broken.

Checking the film density

- Make test exposures at 30 kV with 2 cm Plexiglas for all film-screen systems used and check the film density in each case. The films must either have a density of 1.5 or the density required by the customer.
- If necessary, correct the programmed sensitivity values (plug positions) using the Service PC (see section 8-1)
- Before triggering the test exposures, select "Main menu"
- Different film density corrections can be programmed for the different exposure techniques with the "Sens-cor" module.
The following corrections are possible:

For MAMMOMAT C3

Exposures with grid: same "Sens-cor" for all radiographic systems
Exposures without grid: same "Sens-cor" for all radiographic systems
Magnification technique: Select "Sens-cor" with manually

For MAMMOPMAT 3 and MAMMOMAT -Stereo

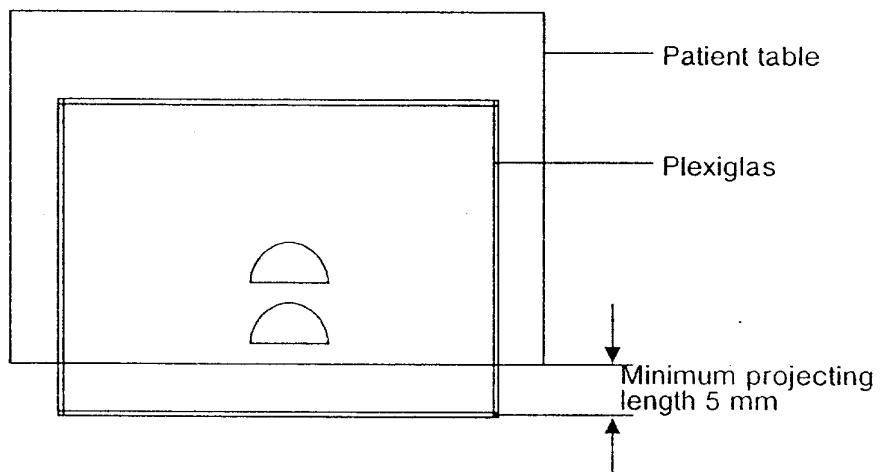
Exposures with grid: different "Sens-cor" for each radiographic system
Exposures without grid: different "Sens-cor" for each radiographic system
Magnification technique: different "Sens-cor" for each radiographic system
Selection is made automatically by attaching the magnification table.

4-6 Start-up and functional test of the IONTOMAT PM

Checking the automatic transparency adaptation

The same density must be obtained with 30 kV and 4 cm Plexiglas as with 30 kV and 2 cm Plexiglas (tolerance: density difference < 0,3).

- When making test exposures, take care to ensure correct positioning of the Plexiglas disks.



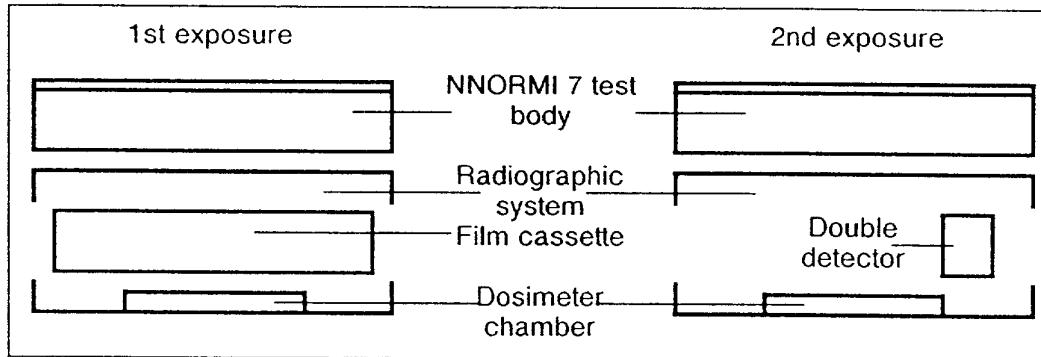
Checking cut-off dose and resolution

This test must only be made in the Federal Republic of Germany in the area of application of the X-ray decree.

The results must be entered in page 9 of the acceptance test certificate supplied.

Ascertain the cut-off dose (K_B) and the resolution (R_g) with the NORMI 7 test body.

Test arrangement (front view)



Procedure:

- Select 30 kV, ■ and □ on the control deck
- Apply the NORMI 7 test body to the radiographic system flush with the chest wall side.
- Slide film cassette into the radiographic system
- Trigger the first exposure
- Note the mAs reading shown on the control deck ($Q_{g(1)}$)
- Process the film, measure the resolution (R_g) and density (D) and enter in the form
- Position the dosimeter chamber in the cassette slot
- Select 250 mAs on the control deck
- Trigger second exposure
- Record the dose value ($K_B(2)$) measured as well as the associated mAs reading ($Q_{g(2)}$)
- Calculate and record the cut-off dose

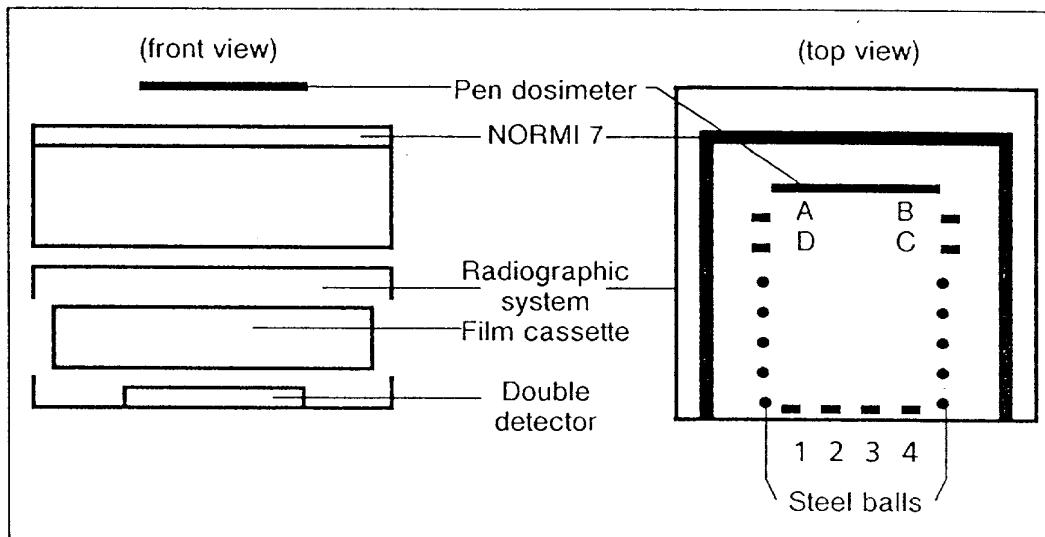
$$K_B = K_B(2) \times Q_{g(1)} / Q_{g(2)}$$

4-8 Start-up and functional test of the IONTOMAT PM

Output values of constancy testing

Determine the output values of the constancy testing at approx. 30 kV with the customer's own constancy test body (NORMI 7 test body etc.) and enter them in the form stapled to the acceptance test certificate

Test arrangement



| Plexiglas steps: | Woven steel wire: |
|------------------|-------------------|
| 1 = 40mm | A = 100 µm |
| 2 = 43mm | B = 80 µm |
| 3 = 49mm | C = 63 µm |
| 4 = 46mm | D = 40 µm |

Procedure:

- On the control deck, select a value of around 30 kV ■ and □
- Apply the NORMI 7 test body to the radiographic system flush with the chest wall side.
- Slide film cassette into the radiographic system
- Trigger the exposure and process the film
- Measure the resolution (A-D), density (1-4) and the over-radiation on the chest wall side and enter in the form (steel balls)
- Read off the pen dosimeter and record the dose value.

Setting the real time clock

To achieve the full power, the measured impedance must not exceed the following values:

| MAMMOMAT 3/Stereo | MAMMOMAT C3 |
|-----------------------------|-------------------|
| 0.25 Ohm at 110 V | 0.35 Ohm at 110 V |
| 0.45 Ohm at 208 V | 0.70 Ohm at 208 V |
| 0.50 Ohm at 230 V | 0.80 Ohm at 230 V |
| 0.60 Ohm at 240 V | 1.00 Ohm at 240 V |
| 0.65 Ohm at 277 V | 1.05 Ohm at 277 V |
| 0.85 Ohm at 400 V (2-phase) | 1.40 Ohm at 400 V |

If the above values are exceeded, reduce the generator power as follows:

Setting the tube current reduction

In the Mammomat 3 / 3 Stereo, the *tube current reduction* can be switched on. In this way the tube current is reduced to approx. 50 mA at the start of the exposure. To avoid possible grid lines, the tube current reduction should be switched on if with the film/screen system chosen by the customer and the selected tube kV the following mAs values are exceeded with 20mm Plexiglas:

Molybdenum tube: < 15 mAs

Tungsten tube: ≤ 18 mAs

The *tube current reduction* is effective only in Iontomat mode

- Main menu
Configuration <Enter>
Miscellaneous <Enter>
Tube mA red. <Enter>
Tube current reduction at short exposure times
TCR switch is on / off
<↓> with <↓> switch on or off
<F2> with <F2> save the progr. values
Exposure time with 50 mA tube current
is ms Enter the time for which the tube current reduction should be effective at the start of exposure (in 50 ms steps)
<F2> with <F2> save the progr. values

Reducing the radiographic power

- Main menu

Configuration <Enter>

Miscellaneous <Enter>

Red. of Power <Enter>

Reduction of Power depending on Line quality

Tube is P 49 Mo 03 (of the built-in tube)

Select nominal line voltage

<↓> <↑> <Enter> Enter line voltage

Type in line impedance

Line impedance Ohm Enter the measured line impedance

Calculated power isKW The max. possible tube power is displayed

<F2> with <F 2> save the progr. values

Only for MAMMOMAT C3:

kV default value on powering up

The default value on pwering up can be programmed with this module

- Mainmenu

Configuration <Enter>

Miscellaneous <Enter>

Wakeup kV <Enter>

Display wake-up value is ... kV

<F 2> save the programmed value with <F 2>

Recording the programmed values

Save the programmed values at menu command "SAve config. file".

- Mainmenu <Enter>
- SAve config file <Enter>
- <F2> Save data with <F2>

Note: No write-protection on the diskette

Reading the exposure counter and deleting the error memory

Read the exposure counter and delete the error memory after putting the stand into service.

a) Reading the exposure counter

- Mainmenu
- Service <Enter>
- Show exposure counter <Enter>
- Enter the current counter reading in the certificate.

b) Deleting the error memory

- Mainmenu
- Service <Enter>
- Del error buffer <Enter>
- <Y> with <Y> delete the error memory
- <F 10> Leave the program with <F 10>

Removal of the measuring instruments

- Remove the Service PC.
- Remove the connected meters.

Note: The protective ground wire resistance of the system is checked and the paneling fitted to the power cabinet after the stand is put into operation (see "Stand" setting instructions).

Working with the Service PC

Password protection



The Mammomat software is protected by a password.

In a confidential circular, the

- Technical Managers and the
- Service Managers

were informed about the password.

Regarding the password, please ask your manager.

Description of the syntax used in these instructions:

< > The indication of which function keys to press is given between these characters.

For example: <Enter>, <ESC> etc.

CAPITALS Capital letters indicate data which must be entered unchanged.
For example: the name of a register, files etc.

Italics Italics represent data in which a value should be entered.
For example: For user name, the name of the technician should be entered.

[] Square brackets enclose additions to commands which may be optionally entered.

Bold Data relating to formats, user entries etc. shown bold and as it appears on the monitor screen and which is important for the following entry

— This character indicates that at this point the space key must be pressed.

xx yy zz Data can be entered in place of "x, y, z" (e.g. day's date).

{ } Curved brackets indicate that out of several terms listed one below the other, one must be selected.

Notes!

Important remarks are indicated in a box.

***** When the password is entered, only these characters are shown..

Menu selection: When several menus, programs, files etc. are presented for selection, they are shown in a box (program window).
Selection is made with the keys < ↑ > and < ↓ >. The module selected is highlighted in the display.

- <Enter> Every entry must be confirmed with the <Enter> key.
- <ESC> ESC allows paging back through the program.
- <xx> + <y> For the selection of some functions, it may be necessary to press 2 keys simultaneously
Procedure: For example, press <Shift> key and keep it depressed, press key <*> and then release both keys.
- <F 1> The key <F 1> calls up a selective help text.
- <F 10> The key <F 10> exits the program.
- XXX - - XXX - -** By this means, the way is shown how to call up a particular subroutine
XXX - - XXX (display window).
For example:
Mainmenu ---
 Configuration ---
 Iontomat PM ---
 Corr. curve ---
- D702: S3 on Position "1"!**

Connecting the Service PC:

- The Service PC must be connected with the cable (part no.: 96 60 978 RE999) to p.c. board D 702 of the generator (no diskette must as yet be in the drive).

Example illustrating use of the Service PC:

- Switch on generator and Service PC
- After initialization, the Service PC screen shows: C:\>
- Now insert the diskette with the service program
- Select the appropriate drive A or B: {A:} {B:} <Enter>
- The screen shows: A:\> or B:\>
- Select the service prog. required, e.g.: MAMC2 <Enter>
- The program asks for the user's name: User name
- Enter the name of the service technician, e.g.: NN <Enter>
- The program asks for the password: Password
- Enter the password: ***** <Enter>

Working with the Service PC

- The display window shows: **Mainmenu**
- Select the program part to be used: <↑> [and/or] <↓>
<Enter>
- The program part selected is shown with a background, e.g. **Configuration**
 - If necessary, additional subroutines can be similarly selected here.
- Make the necessary entries in the appropriate part of the program.
- Complete the entry with:
- After completing the entry, save the data with: <F 2>
- Page back in the program with: <ESC>
 - The appropriate instructions are shown on the monitor.
- End the procedure with the Service PC with: <F 10>

RXE 321 /Leikam
TD RX 5 /Guggenmos
TD RX 7 /Kühnlein
TD RX1/Hoffmann
TDU 6/Wareham